# WHAT AILS ADONIS?

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In common with several other species, the Adonis Blue butterfly *Lysandra bellargus* Rott. has experienced a decline in recent years. Ecological studies which are in progress (Dr. Jeremy Thomas, personal communication) may suggest reasons for this decline and, hopefully, allow effective conservation measures to be taken. As part of a wider conservation effort (Morton, in press *Biological Conservation*) *L. bellargus* has also featured in laboratory studies. In 1981, these studies suggested a fascinating aspect of the ecology of *L. bellargus* which deserves further investigation.

*Lysandra bellargus* and *L. coridon* Poda are often cited as examples of insects whose distributions are limited by that of their larval foodplant. However, both species may be absent from sites where this plant, *Hippocrepis comosa* L., is quite abundant. Moreover, although some sites support sizeable populations of both species, *L. bellargus* is frequently absent from sites which are suitable for *L. coridon*. Although this may be as a result of competitive exclusion, there are no data with which to support this view. Perhaps a more likely explanation is that *L. coridon* has ecological requirements which are more easily met than those of *L. bellargus.*

Both *bellargus* and *coridon* may be reared on artificial diets (Morton, 1981). During 1981 a group of *bellargus* larvae failed on one particular batch of diet, although this same batch was accepted by *coridon*. It was noted that this batch contained *Hippocrepis* leaf powder, from plants collected at a site which supports only *coridon*. Could it be that the diet failed because it contained plant material which was toxic to *bellargus*? Based on this chance observation, I would like to suggest the following hypothesis, which will be tested experimentally in 1982.

Many legumes are cyanogenic and there is direct evidence that cyanogenesis in *Lotus corniculatus* L. and *Trifolium repens* L. does have a protective function against herbivores, especially snails and slugs (Jones, 1962; Ellis *et al.*, 1977a, 1977c). The chemistry of cyanogenesis is reasonably well understood (Conn, 1973; Seigler, 1975) and the genetic basis of the character in the two plants mentioned above has been discussed by Nass (1972) and by Jones (1977). Moreover, phenotypic expression of cyanogenesis may depend on temperature in some individuals (Ellis *et al.*, 1977b). Reduced expression of the cyanoglucoside under cold conditions would not be deleterious since molluscs are notably inactive at low temperatures (Crawford-Sidebotham, 1972). However, in the absence of selective grazing the cyanogenic forms are probably at a disadvantage to the acyanogenic plants, due to their increased metabolic demands.

Compared to molluscs, lycaenid larvae are probably fairly insignificant herbivores. By fortunate mutation some, such as *Polyommatus icarus* Rott., synthesize the enzyme rhodanese (Parsons &

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Rothschild, 1964) and can detoxify the foodplant. By doing so, they are able to exploit a food resource which is not accessible to animals lacking rhodanese, and thus experience reduced competition.

Given the above facts, one only has to assume that (a) *Hippocrepis comosa* is like other legumes and is polymorphic for cyanogenesis, (b) *coridon* larvae possess rhodanese and can detoxify these plants, and (c) *bellargus* larvae lack this enzyme, to produce a plausible hypothesis for *bellargus* having a more restricted range than *coridon*. Thus, *coridon* can exist on sites where the plants are toxic or non-toxic, whereas *bellargus* would be restricted to the latter.

In the absence of experimental tests of this hypothesis, we can only judge its plausibility by testing its predictions against field observations. In addition to the basic differences in distribution, there are some other predictions:

1) Production of rhodanese would be metabolically expensive so *coridon* should have a longer larval stage than *bellargus* due to reduced feeding efficiency.
2) *coridon* adults dispersing from their home sites are likely to have equal reproductive success whether the new sites they reach have toxic or non-toxic plants. For *bellargus,* however, such new sites may be unsuitable since most plants may be cyanogenic. We would therefore expect *coridon* to have higher dispersal rates than *bellargus.*
3) Maximum expression of cyanogenic phenotype might be expected between April and June, the period of maximum grazing by molluscs. *L. bellargus* would be able to exploit 'cyanogenic' plants by avoiding this time; i.e. feeding before April and after June. However, *coridon* may have to partly compensate for a longer larval stage by feeding at higher temperatures.

While these phenomena may be explained in many other ways, it is at least of some interest that the field observations are not contrary to the independent predictions of the hypothesis. However, even if the basic idea proves sound, the true situation is likely to be more complicated. For example, *bellargus* may possess rhodanese but a form of the enzyme which is effective only at different temperatures from the form which may be found in *coridon*. Or the effect may be due to an entirely different complex of toxic plant materials.

If readers agree that the idea is plausible, they could provide valuable assistance with the experiments this season. Initially, there is a need to screen plants in *coridon* and *bellargus* sites for production of cyanide. If anyone would be prepared to provide samples of plants for analysis, I would be most grateful if they would contact me.

## References

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THE DINGY SKIPPER: ERYNNIS TAGES L. AB. RADIATA BROWN IN DORSET. – On the 17th June 1979, at my school, Milton Abbey, Dorset, I took a short series of *E. tages,* one of which was a variety, although I did not know its name. However, in December 1981, Mr. John Swiner kindly lent me some back issues of the *Record* to browse through. In the October 1970 issue, plate XV, p.253, there is a photograph and description by A. D. R. Brown of *E. tages* ab. *radiata.* I instantly recognised this specimen as being almost identical to my own which is ♂, and although a little worn is still very distinctive. Mr. Brown (*loc. cit.*) states that he knows of the existance of only two ab. *radiata* (his own included), so it is pleasing to be able to record a third example. – R. D. G. BARRINGTON, Old College Arms, Stour Row, near Shaftesbury, Dorset SP7 OQF.

CORRECTIONS. – In vol. 93, p. 197, line 5 up, for *monsticta* read *monosticta;* line 3 up, for *discupuncta* read *discipuncta,* for *Area* read *Aroa;* line 2 up, for *Nemerophanes* read *Hemerophanes,* for *N. enos* read *H. enos.* – D. G. SEVASTOPULO.